Eating Attitudes And Self-Regulation In Female Athletes In Classical Ballet Through The Perspective Of Dynamical Social Psychology

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Abstract

We examined dynamical patterns in the course of eating attitudes in female classical ballet dancers. We recruited fifty individuals at professional level in classical ballet using the Self-Regulatory Eating Attitude in Sports Scale (SREASS) and the Virtual Self-Service Restaurant (VSSR) for over eight weeks. According to their scores in SREASS, we divided our sample into two groups, the first with low self-regulation scores and the second with high self-regulation scores. Measurements were conducted for over eight weeks in order to test whether food intake varies over time differently depending on participants' self-regulatory eating attitude. The results clearly supported the hypothesis of a greater variability of food intake for people with the lowest level of SREA. Limitations and implications of these results are discussed.

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I. Eating disorders and classical ballet

According to the Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition (DSM-IV; American Psychiatric Association, 1994), there are two official Eating Disorder (ED) syndromes: Anorexia Nervosa (AN) and Bulimia Nervosa (BN). There is also a third one called Binge-Eating Disorder (BED), which has not been recognized officially yet but it is very possible to happen in the near future (Attia et al., 2013). Additionally, there is also the category of Eating Disorders Not Otherwise Specified (EDNOS, American Psychiatric Association, 1994), a diagnostic category for individuals suffering from an eating disorder of clinical severity that does not meet the diagnostic criteria for anorexia nervosa or bulimia nervosa (Dalle Grave & Calugi, 2007).

Among eating disorders, Anorexia Nervosa (AN) is defined by a constant thought of getting thin and an absolute fear of eating, as the consequences may lead the individual to gain weight (DaCosta & Halmi, 1992). The person believes that the onset of a proper nutrition will probably mean the onset of obesity and therefore this brings misery and sadness. To avoid these consequences, the individual chooses a very strict and often dramatic over restriction of food. There is a phobia of weight gain at that extent that the person avoids eating almost everything and prefers to drink only water (DaCosta & Halmi, 1992). Over activity is also very common in this case, as it decreases the chances of gaining weight even more. People with AN choose to eat only low calories foods and try to avoid social events that may include food, as they want to have control of the exact portion of food they intake all the time (DaCosta & Halmi, 1992).There are also cases when anorexics purge after eating through vomiting or use of laxatives, diuretics, or enemas, especially after eating something that they were not supposed to. There are a number of patients, almost half of them, that end up developing binge-eating episodes quite often (DaCosta & Halmi, 1992).

On the other hand, Bulimia Nervosa (BN) is diagnosed in normal or overweight individuals, but not in anorexics and is connected with binge-eating episodes (Gleaves, Eberenz & May, 1998). Overeating is an action that actually helps them at the beginning, as it seems as a relief for them. However, shortly after, they feel guilty and then compensate for overeating through self-induced vomiting, laxative misuse, intensive exercise or fasting

(Gleaves et al., 1998).What makes BN to differentiate from binge-eating disorder is the fact that BN includes a combination of overeating and compensation and not just overeating. People with BN consume very big portions of food, unable to control it and as a result they end up with a massive quantity of calories. Anxiety, depression and feelings of shame come quickly on the surface after a binge episode and the person feels very bad and guilty (Gleaves et al., 1998). The mood of the individual however can change rapidly and this is one of the most interesting parts of this eating disorder, as individuals with BN may shift from well-being to despair, anxiety and depression pretty rapidly (Gleaves et al., 1998).

The most recent eating disorder is called Binge-Eating Disorder (BED) and is characterized by those individuals who have binge episodes without the compensation part (Dalle Grave & Calugi, 2007). This disorder resembles partially to BN but the main difference is the lack of self-punishment, meaning there is no self-induced vomiting, laxative misuse, intensive exercise or fasting. This eating disorder includes abnormal portion of food, rapid eating and eating without being really hungry. Most of the times, people with BED do feel guilty and disgusted by themselves but they are not led to any type of compensation (Dalle Grave & Calugi, 2007).

Anorexia nervosa and bulimia nervosa occur mostly in the industrialized and more developed countries compare to the less developed ones (Wakeling, 1996). There is a stereotype that teenagers are those who suffer the most from eating disorders, but in most cases, ED are observed in young adult women and there is a tendency to remain chronic or to develop again in the later future. Eating disorders are a female syndrome, as they are only about one-tenth as often in men as in women. However, both anorexia and bulimia are noted in male population too (Wakeling, 1996). Research shows that eating disorders most of the times co-exist with other symptoms of psychopathology, such as anxiety, depression, mood disorders, personality disorders, substance abuse and posttraumatic stress. Råstam (1992) reported a 40% rate for currently co-morbid major depression in her anorexic sample, a 70% rate for overall mood disorders, and a rate of lifetime mood disorder in excess of 90%. Another study by Zaider, Johnson and Cockell (2000) indicated an important relationship between ED and dysthymia, a milder chronic mood disturbance.

Generally, eating and mood disorders are very close, as they both have similar routes and neurobiological substrates. Wade et al. (2000) found that both genetic and environmental factors contribute significantly to AN and major depression. But anxiety disorders also are very common in eating disorders and they vary from 20% (Herzog et al., 1992) to more than 80% (Godart et al., 2000). Studies report various anxiety disorders, as generalized anxiety, phobias, panic attacks and obsessive compulsive disorder (OCD). OCD resembles closely the symptomatology of eating disorders, as the obsessions with weight and body image can be also very compulsive actions (Thornton & Russell, 1997).

Studies indicate that BN is more associated with substance abuse compared to AN (Holderness, Brooks-Gunn & Warren, 1994). Lilenfeld et al. (1998) found substance abusers in an eating disordered population to show significantly more social phobia, panic disorder and personality disorders. Holderness et al. (1994) discussed the differences between bulimia and substance abuse disorder, a so-called addictive personality. The term is used to describe both syndromes but the evidence is not enough yet to be convincing. Eating disorders are also associated in most cases with adverse and traumatic life experiences (Everill & Waller, 1995; Wonderlich & Brewerton, 1997). Findings show an existing relationship between ED and posttraumatic stress disorder (PTSD). One study reported PTSD in about half of 294 women with AN, BN, or EDNOS (Gleaves et al., 1998). One other study reported that 29 obese women with BED showed more dissociative symptoms and more traumatic experiences, than did 35 obese women with no binge-eating symptoms (Grave et al., 1997).

Personality disorders and eating disorders have also been studied and become a matter of arguing for lots of years (Vitousek & Manke, 1994). A meta-analysis (Rosenvinge, Martinussen & Ostensen, 2000) of 28 studies on this area shows a higher proportion (58%) of eating-disordered than of comparison women (28%) to have a personality disorder. Personality disorders are frequently present in anorexic and bulimic syndromes and may be associated with various reasons. For example, a highly restricted anorexic person appears to have an anxious and fearful personality. One study showed that 26% of women recovered from AN or BN to show some form of ongoing personality disorder (Matsaunaga & Kiriike, 2000). The theory that best describes the reasons why eating disorders and personality disorders are associated is a multidimensional,

biopsychosocial causality (Garfinkel & Garner, 1982; Striegel-Moore, Silberstein & Rodin, 1986). In this theory, eating disorders are described as a combination of biological factors, social pressure, psychological tendencies and developmental processes. The psychological theories on ED differentiate; however there is a common concern when it comes to psychological characteristics and developmental dynamics. Anorexia nervosa has been associated with anxiety and the constant need of having control, whereas bulimia nervosa with problems in self-regulation, unsuccessful efforts to remain stable and to regulate tensions (Garfinkel & Garner, 1982).

Psychodynamic models suggested that anorexic symptoms are a defence against conflicting drives (e.g., sexual drives), as eating was believed to invoke forbidden sexual fantasies and food refusal to reduce associated anxiety (Waller, Kaufman & Deutsch, 1940). Crisp (1980) believed that AN is a response to phobias and avoidance and it is expressed as an escape from childhood to puberty. Bruch (1973) underlined the over involvement of the mother and the failure to handle the child's self-affirming behaviours as a reason that the child can adopt an eating disorder in the future. Strober (1991) addressed the incompatibility between developmental imperatives surrounding puberty and the hyperactivity to social approval. Other related theories indicate food refusal as a reaction of the child to parental pressure and control (Humphrey, 1991; Johnson, 1991). Developmental theories suggest that bulimic persons are mostly linked to negative parental patterns, as criticism, rejection and blaming (Humphrey, 1991; Johnson, 1991).

Not only theories but also empirical findings that are related to the cognitive and emotional part of the individuals with eating disorders provide reasons why the latter ones may be developed. Studies about personality showed people with ED to be depressed, anxious and neurotic (Sohlberg & Strober, 1994). Norman, Blais and Herzog (1993) found schizoid or avoidant tendencies among anorexics and more histrionic tendencies among bulimics. Casper, Hedeker and McClough (1992) found bulimics to be less conforming and more impulsive than anorexics are. Bulik et al. (1995) found bulimics to be more novelty seeking than anorexics or binger anorexics. Clinical observations also associate ED with specific personality traits. Lilenfeld et al. (2000) suggested that perfectionism is noticed in individuals who suffer from BN but also in AN.

Perfectionism has been noted to be rising much more in ED compared to other mental disorders (Fairburn et al., 1999). Of course, having a tendency for perfectionism does not predict any type of ED in the future (Calam & Waller, 1998). Newton, Freeman and Munro (1993) found that almost half of the bulimic patients will probably show self-harming behaviours and other impulsive characteristics, such as substance abuse or sexual over activity. Eating disorders can be characterized, as mentioned above, by a disturbed body image perception. Although some of the findings show unusually harsh attitudes toward body image in ED patients, other studies indicate that eating disordered individuals have body image perceptions and attitudes that are quite normal (Hsu & Sobkiewicz, 1991). Body dysmorphic disorder is related to disturbed body image perception and it is defined by distress or functional impairment due to a preoccupation with a real or an imagined physical defect (Olivardia, Pope & Hudson, 2000).

Polivy and Herman (1985) indicated that the constant worry about calories and food can lead to a breakdown of cognitive controls upon appetitive behaviours and lead to ED. There is also a strong connection between binge eating and emotional factors which include negative feelings as depression, anxiety and anger (Polivy & Herman, 1993; Steiger et al., 1999; Stickney, Miltenberger & Wolff, 1999). When it comes to cognitive functioning, people with ED are linked to neuropsychological impairments associated with higher-level cognitive functions such as active memory, attention and problem solving (Szmukler et al., 1992). Blanz et al. (1997) found that BN but not AN patients show better nonverbal than verbal performance. Some findings indicate alarmingly permanent structural and neuropsychological alterations (Lambe et al., 1997).

There is also the biological factor that we should take into consideration, as ED can be inherited and there are more possibilities for the person to adopt a disturbed eating behaviour if this runs within the family. Strober et al. (2000) found that there are high risks for a female to become anorexic if there is a relative or a member of the family that suffers from an ED already. Lilenfeld et al. (2000) found that relatives of AN and BN persons both show similarly elevated risk for ED. Additionally, studies indicate a high rate of mood disorders, especially unipolar depression, among relatives of anorexics (Strober et al., 1990) and bulimics (Logue, Crowe & Bean, 1989). Similarly, other studies indicate alcohol and drug abuse to be increased in ED people and their relatives (Lilenfeld et al., 2000).

There have been some genetic studies in order to identify how much the genes affect people and their relatives in order to adopt an ED in the future. Studies so far had focused their attention on genes coding for serotonin, dopamine and noradrenalin systems. Those studies however, failed to explain the association between the genes and ED. Enoch et al. (1998) found an association between AN and a polymorphism (–1438G/A) in the promoter region of the 5HT2A receptor. This 5HT2A has been found to be associated with both AN restrictor subtype and OCD but not with bulimic ED variants. Levitan et al. (2000) found an association between the C218 allele of the gene encoding for tryptophan hydroxylase and BN.

The neurobiological research has come across some interesting results. There are some monoamine neurotransmitters that can regulate appetite (Brewerton, 1995). Anorexia nervosa has been associated with reduced concentrations of noradrenaline and its major metabolite, 3-methoxy-4-hydroxyphenylglycol (MHPG) in cerebrospinal fluid (CSF), as well as with increased density and sensitivity of platelet _2-adrenergic receptors (Fava et al., 1989). Neuroimaging studies have also found some structural or functional brain abnormalities in ED patients. Using positron emission tomography (PET) and proton magnetic resonance spectroscopy (H-MRS), researchers found both structural and functional brain changes in anorexic and bulimic patients (Hoffman et al., 1989).

In the sport context, anorexia nervosa is an illness and especially ballerinas can get ill very easily (Druss & Silverman, 1979). There is some experimental evidence that the degree of body image disturbance seems to be a predictor variable for the course of the illness (Slade & Russell, 1973; Button, Fransella & Slade, 1977; Casper et al., 1979; Garfinkel, Moldofsky & Garner, 1977; Halmi, Goldberg & Cunningham 1977). Athletes with severe body image disturbances have more therapeutic failures in history, less body weight increase, greater psychosexual immaturity, and a greater tendency for denying their illness than do those with mild body image disorders (Druss & Silverman, 1979). There are three characteristic psychological features of AN: disturbance of body image, disturbance in perception of affective and visceral stimuli and an all pervading sense of ineffectiveness (Bruch, 1962). Meerman (1983) investigated the perceptual disorders of body image between two groups, anorexia nervosa patients and classical ballet dancers. He used three different experimental methods for this study, a video distortion of the width of the

head/whole body of the subject (Meermann, 1983), a modification of the Image Marking Procedure first described by Askevold (1975) and a paper-pencil version of the Askevold (1975) method. The results showed that both groups underestimated their body figure, especially when it comes to the group of classical ballet dancers. The latter ones showed significantly higher overestimation for their thighs, calves and hips compared to the AN patients.

Garner, Olmsted and Garfinkel (1983) compared the psychological characteristics of patients with primary AN with classical ballet athletes. They had three different groups, college students, classical ballet dancers and a comparison sample of patients with AN. They were requested to complete a self-report measure during regular class time as part of a study of the eating behaviour of college students. The questionnaire that was given was the Eating Disorder Inventory (EDI), which is a broad range, self-report questionnaire designed to assess the cognitive and behavioural dimensions characteristic of anorexia nervosa (Garner et al., 1983). The results showed that certain traits frequently observed in AN patients are relatively common with traits observed in classical ballet dancers.

Hamilton, Brooks-Gunn and Warren (1985) examined the incidence of eating disorders, the distinct types exhibited, and the psychological profiles associated with the different types. AN is believed to have increased in the past several decades, due to the new cultural ideal of the thin woman (Gamer et al., 1980). It is most common in upper-middle-class white females. With regard to environmental factors, the best known example involves participation in sports, or activities in which weight must be restricted for performance (gymnastics, dancing, track). For the measurement, they used not only demographics, as maternal and paternal education, birth place and age when dance training began, but also a series of different scales. They used thevEAT-26, which is an eating problems scale developed by Gamer and Garfinkel (1979). They also asked the dancers to tell them whether six behaviours typically used to identify anorexia nervosa were characteristic of them or not. These six behaviours included deliberate weight loss, menstrual irregularity, overactivity without enjoyment, feeling terrified of fat, feeling fat despite others' feeling you are too thin, and being obsessed with thoughts of food. For the psychological functioning, they used The Self-Image scale and two subscales of the Eating Disorders Inventory (Gamer, Olmstead, & Polivy, 1983). The results showed that no blacks

reported either anorexia nervosa or bulimia. In addition, the black dancers had more positive body images and were less concerned about dieting. Dancers with and without self-reported anorexia nervosa exhibit different psychological profiles, similar to studies of non-athletic women (Garfinkel, Moldofsky & Gamer, 1980; Holmgren et al., 1983). Dancers, in general, often exhibit some of the characteristics thought to be associated with anorexia nervosa: an elevated need to achieve, perfectionism, fear of fatness, concerns with body, compliance, dieting, and high levels of activity (Vincent, 1981; Bruch, 1978). The bulimic dancers did not, in general, exhibit different psychological profiles than the non-bulimics. However, they did exercise less and had higher diet scores.

One year later, the same researchers examined the relationship between nutritional intake and eating and anorectic behaviours, menstrual irregularity, and weight in female classical ballet dancers (Hamilton, Brooks-Gunn, and Warren, 1986). For the purpose of the study, they measured the food intake, the eating problems and menstrual irregularity, their weight, height and the percent ideal weight. Subjects were asked to record all food and drink ingested during the last 24 hours of a typical performance week. They were also given the EAT-26, which is an eating problems scale developed by Carner and Garfinkel (1979). Dancers were asked to indicate whether three behaviours typically used to identify anorexia nervosa were characteristic of them or not. These three behaviours included feeling terrified of being fat, feeling fat despite others says you are too thin, and being obsessed with thoughts of food. Finally, the dancers were asked to report menstrual irregularity and the longest time they had gone without menstruating (Hamilton et al., 1986).

The findings suggested that female classical ballet dancers tend to be undernourished when compared with reference women of similar age, weight, and height. Heavier dancers tend to practice more restrained eating than the thinner ones. Eating problems, as inferred from the EAT-26 were related to nutritional content. Specifically, dancers who were terrified of being fat ate less fat, protein, niacin, and iron; those who felt fat had diets lower in niacin; and those who were obsessed with thoughts of food consumed less protein and niacin and somewhat less fat. A high incidence of menstrual irregularity was reported by the dancers. Nutritional differences were found between dancers who did and did not menstruate regularly. Those with irregular cycles consumed significantly less

protein, iron, and niacin than the dancers with regular cycles. They also reported more restrained eating and more anorectic behaviours (Hamilton et al., 1986).

Harris and Greco (1990) measured classical ballet dancers' attitudes about weight and performance, assuming that dancers would report a high degree of concern about their weight. They also measured scores of the Eating Attitude Test (Gamer et al., 1982) and the Eating Disorders Inventory (Gamer, Olmstead, & Polivy, 1983) which they gave to the participants. The participants filled an anonymous questionnaire about their dance history and their weight and how they and others viewed it. They were then given a 12-item obesity knowledge test (Price, O'Connell & Kukulka, 1985) and in the end they responded to the items on the eight subscales of the Eating Disorders Inventory and the three subscales of the Eating Attitudes Test. Finally, they were asked two open-ended questions about weight concerns in gymnasts and about changes in their own feelings about weight in the last few years (Harris & Greco, 1990). The results showed that the dancers were extremely concerned about their weight, although their weight, body mass index, and percentage of body fat were low, they considered themselves too fat and felt that others, especially coaches, agreed with them. Not only were they dissatisfied with their bodies and eager to lose weight, but they weighed themselves frequently, thought about their weight a lot, and talked about it often. They felt that even a small weight gain would have a deleterious effect on their performance and experienced a number of unpleasant feelings when they weighed more than they wished, which was most of the time. The obesity knowledge test revealed a number of questions on which the respondents' scores did not differ significantly from chance. The athletes who were competitive at the national level were less likely to be dissatisfied with their bodies, less concerned about dieting, and less knowledgeable about obesity (Harris & Greco, 1990).

Petrie (1993) wanted to extend eating-continuum research to female classical ballet dancers. He wanted to determine whether the dancers in eating-disorder groups differed on various attitudinal and personality characteristics that have been associated with eating disorders. He supposed that higher levels of pathology on the personality and attitudinal measures would be positively related with more disordered eating. To measure the disordered eating, Petrie used the Bulimia Test-Revised (BULIT-R; Thelen et al., 1991), a 36-item, objective, self-report measure whose responses were used to classify participants

into the disordered-eating categories. The Body Parts Satisfaction Scale (BPSS; Bohmstedt, cited in Mintz & Betz, 1988) was used to measure dancers' satisfaction with their bodies. The Rosenberg Self-Esteem Scale (Rosenberg, 1965) measured dancers' attitudes toward themselves, specifically their level of self-acceptance. The degree to which individuals endorse U.S. cultural values concerning attractiveness was measured by the 12-item Beliefs about Attractiveness Questionnaire (BAQ; Mintz & Betz, 1988; Striegel-Moore, Silberstein, & Rodin, 1985). Finally the dancers had to report also the following: current weight and height, ideal weight, age, year in sport, race, and scholarship status.

The findings of the study revealed that the dancers reported moderate endorsement of cultural values of attractiveness, generally high levels of self-esteem and moderate satisfaction with their bodies in spite of wanting to be almost 7 pounds lighter (Petrie, 1993). A big percentage of the dancers (61.3%) were classified as having an intermediate form of disordered eating. Gymnasts experience often additional unique, sport-related pressures to achieve a certain ideal body size and shape. A relationship between eating-disorder disturbance and personality/attitudinal pathologies existed, with the bulimics evidencing significantly higher levels of pathology than the normal ones. It appears that many female dancers may experience personality or attitudinal disturbances (e.g., low self-esteem, body dissatisfaction) without developing a diagnosable eating disorder (Petrie, 1993).

Le Grange, Tibbs and Noakes (1994) investigated the prevalence of anorexia nervosa and anorexia nervosa-like symptoms at a university ballet school. For that study the researchers used the Eating Attitude Test (EAT) (Garner & Garfinkel, 1979) as well as a demographic and dietary history questionnaire about average daily food intake, menstrual history, weight history, and other demographic details. Dancers who scored highly on the EAT and/or with current secondary amenorrhoea or primary amenorrhoea if aged 16 years or over were invited for a semi structured psychiatric interview. The Morgan-Russell scales (Morgan & Russell, 1975) were used for this purpose and comprised five subscales: Nutritional Status, Menstrual Status, Mental Status, Socio-economic Status, and Psychosexual Status. Ten months later, the dancers previously interviewed and still at the school were reassessed for weight, eating attitudes, and mental status (Le Grange et al., 1994). Results from that study showed a prevalence of 4.1% of anorexia nervosa cases in a

group of female ballet students. Moreover, a significant proportion of students who did not qualify for a diagnosis of anorexia nervosa presented with abnormal eating attitudes and habits, excessive concern about weight and shape, low weight, and menstrual abnormalities. Just over one half the students were underweight and reported deliberate attempts to lose weight during term times. Almost a similar number of students indicated that they perceive themselves as fat and control their food intake by dieting, vomiting, or laxative and diuretic abuse. One third of students at the ballet school reported some form of menstrual abnormality while menarche was also often delayed (Le Grange et al., 1994).

Benn and Walters (2001) studied eating disorders and women in ballet and their attitudes and behaviours that influence their body image. The world of ballet is competitive and quite physically-focused. The female ballet dancers are not only influenced by their peers but also by their teachers, role models, company managers and directors. They actually learn to control their body, as they learn that controlling body shape and size is essential to success in their careers (Benn & Walters, 2001). Interviews, questionnaires and observation were used and there were three main topics that discussed, nutritional knowledge and health, the ballet aesthetic and disordered eating practices and the factors influencing a dancer's body image. The results indicated that the identity and self-esteem of dancers appeared to be affected by striving to attain a ballet physique and many characteristics of eating problems were identified. It appeared to be a more balanced attitude towards physique and health issues among the students than the professionals. The influences seem to come mainly from outside the ballet world, like from fashion, the media and the peers (Benn & Walters, 2001).

Anshel (2004) studied the eating patterns of ballet dancers and non- dancers. He hypothesized that dancers would be at greater risk for developing eating disorders than non-dancers. For that research, he used the Eating Disorder Inventory-2 (EDI-2, Gamer, 1990). He also used the Food Intake Attitude Survey (FAIS) that was developed for that study to assess attitudes and behaviours specifically relevant to disordered eating in dancers that are not included in the EDI-2. The results supported the hypothesis that dancers would have a greater pursuit of thinness and body dissatisfaction than non-dancers. They were also more perfectionistic than non-dancers. However, dancers did not demonstrate more bulimic tendencies than non-dancers (Anshel, 2004). Finally, results showed that dancers would not

have similar characteristics as individuals with psychopathological eating disorders. It is also possible that eating disorders are over-represented in ballet dancers because dancers tend to control a lot their body weight in order to remain slim (Gamer & Garfinkel, 1980; LeGrange et al., 1994).

Micheli et al. (2005) wanted to assess the changes between pre season and post season body composition values of professional male and female ballet dancers in one season. They measured weight, height, Body Mass Index (BMI) and Body Fat Percentage of professional ballet dancers, pre and post season. The most important observation was the significant changes in body composition over the course of a professional ballet season in the female dancers whereas male body composition remained relatively the same. Professional ballet dancers have high physical demands and are challenged to have bodies that are aesthetically pleasing. Women tend to be always more worried about the aesthetic part, which is proven once again by that research (Micheli et al., 2005).

Thomas, Keel and Heatherton (2005) studied ballet school affiliation with a national professional ballet company, regional professional ballet company and eating disturbances. They used a pre-existing instrument used in a study of eating disorders among college students (Heatherton et al., 1995), which included a 26-item version of the Eating Disorder Inventory (EDI; Garner, Olmsted, & Polivy, 1983) containing the Drive for Thinness, Bulimia, Perfectionism, Maturity Fears, and Interpersonal Distrust sub-scales. Current height and weight was measured and also students were asked to rate their weight satisfaction, and state whether they wished to lose or gain weight. They were also asked to report whether they engaged in behaviours such as dieting, fasting, binge eating, self-induced vomiting, laxative use, or exercise outside of ballet class, and whether they believed they had an eating disorder (Thomas et al., 2005). Results indicated that on measures of disordered eating attitudes, national and local students scored significantly higher than regional students. In contrast, on measures of disordered eating behaviours, including dieting and self-induced vomiting, national students scored significantly higher than regional and local students. Additionally, national students, who exhibited high levels of perfectionism in addition to intense environmental pressure, also demonstrated high levels of both disordered eating attitudes and behaviours. Regional students on the contrary exhibited lower levels of perfectionism (Thomas et al., 2005).

Toro et al. (2008) wanted to establish the prevalence of eating disorders in a Spanish population of dance students and to assess whether certain specific factors related to the ballet school situation might be associated to eating disorders symptoms. The Eating Attitude Test (EAT-26) (Garner et al., 1982) was used to evaluate attitudes to eating and eating disorders symptoms, the Beck Depression Inventory (Beck et al., 1979), for assess depressive symptomatology, the Questionnaire on Influences on Body Shape Model (CIMEC, in Spanish) (Toro, Salamero, & Martınez, 1994), a clinically validated questionnaire to assess influences that favour the internalization of the slender body shape model. Eating Disorders Assessment Questionnaire (CETCA, in Spanish), containing questions based on the DSM-IV diagnostic criteria for anorexia nervosa and bulimia nervosa and a 28-item questionnaire, specially designed for the study, were also administered. Their items referred to situations and circumstances typical of a dance school, following the model used in an earlier study of female athletes (Toro et al., 2004).

The results indicated that the group of adolescent female dance students showed risk eating behaviours similar to those found in adolescents from the general population with the same socio-demographic characteristics (Toro et al., 2008). Significant relationships were found between specific dance school situations and the presence of eating disorders in young and adolescent female students. There were no significant differences between the groups in terms of body dissatisfaction, desire to be more slender, having lost significant amounts of weight, especially controls. Eating risk behaviours seem to be much more closely associated with perceiving and receiving pressure from coaches regarding the body, weight and food than with BMI. Depressive symptoms were also implicated. Both eating attitudes and depressive symptoms were significantly associated with feeling great dissatisfaction with one’s weight and with feeling very worried or anxious when weighing oneself. The role of depressive symptoms seemed to be practically the same as that of eating attitudes (Toro et al., 2008).

Herbrich et al. (2011) investigated for the very first time the frequency of anorexia athletica features, clinical eating disorder diagnoses and eating disorder related psychopathology in adolescent ballet dancers. The participants were ballet dancers from Germany who pursued a career in dance. The experimental group consisted of ballet dancers who were striving for a future career in dance, without ever having shown signs of

disordered diet. On the other hand, the control group consisted of dancers who were diagnosed with anorexia nervosa according to the 10th edition of the International Classification of Diseases and Related Health Problems (ICD-10; Dilling, Mombour, & Schmidt, 2000). The anorexia nervosa diagnosis was also confirmed by a structured interview (Structured Inventory for Anorexic and Bulimic Eating Disorders; Fichter & Quadflieg, 2001). The researchers used demographics questionnaire to compare the groups' social and economic status and also their age, educational level and parents' jobs. They also used a Structured Clinical Interview for DSM-IV Axis I Disorders and Composite International Diagnostic Inter- view (German version: Wittchen, Zaudig, & Fydrich, 1997).

The patients with anorexia nervosa were assessed using the Composite International Diagnostic Interview, a computer-based structured interview (German version: Wittchen & Pfister, 1997). Additionally, the investigators used a Structured Inventory for Anorexic and Bulimic Eating Disorders for DSM-IV and ICD-10 (German version: Fichter & Quadflieg, 2001). The Eating Disorder Inventory 2 was also used (German version: Paul & Thiel, 2005). It consists of 11 subscales. The first three subscales, Drive for Thinness (DT), Bulimia (B), and Body Dissatisfaction (BD) address attitudes and behaviours regarding eating, weight, and body shape. The remaining eight subscales – Ineffectivity (I), Perfectionism (P), Interpersonal Distrust (ID), Interoceptive Awareness (IA), Maturity Fears (MF), Asceticism (A), Impulse Regulation (IR), and Social Insecurity (SI) – focus on more general psycho- pathological dispositions clinically relevant to eating disorders. Finally, the Multidimensional Self-Concept Scale was used (German version: Schutz & Sellin, 2006).

The results showed that the experimental group had fewer symptoms compared to the control group. The training was also much higher in the control group and a 25% of it suffered from amenorrhoea (Herbrich et al., 2011). The anorexic team appeared to have lack of confidence and a strong need for self-discipline and self-restraint than the non-eating disordered controls. The patients with anorexia nervosa showed significantly higher Drive for Thinness, Body Dissatisfaction, feelings of Ineffectivity, Interpersonal Distrust, Interoceptive Awareness, Asceticism, and Social Insecurity than the ballet dancers. The patients scored also significantly lower on all subscales of the Multidimensional Self-

Concept Scale, whereas the ballet dancers scored significantly higher and comparable to the non-eating disordered controls (Herbrich et al., 2011).

Penniment and Egan (2011) hypothesised that people who are highly perfectionist are more likely to either choose participation in more rigorous dance training or are more likely to be successful and thus reach higher levels of success in dance. Dancers spend lots of time practising in front of mirrors and they have a very special relationship with their bodies. Perfectionism and the constant pressure of the social factors is the best combination for a dancer to adopt an eating disorder in the future. A low body weight is often considered to be a prerequisite for a good performance (Jacobi et al., 2004; LeGrange, Tibbs, & Noakes, 1994). The participants were female dancers who had already big experience and almost the quarter of them had an underweight BMI. The investigators used the Multidimensional perfectionism scale (FMPS; Frost et al., 1990), the Dance experience questionnaire (DEQ; Annus & Smith, 2009), the Thinness and restricting expectancy inventory (TREI; Hohlstein, Smith, & Atlas, 1998) and the Eating disorder examination-questionnaire (EDE-Q; Fairburn & Beglin, 1994).

The results showed that there is actually a relationship between perfectionism and EDs. Individuals that scored high on perfectionism are more likely to be successful in dance classes and obtain higher levels of achievement in dance, and participation in more rigorous dance training may lead to individuals being exposed to more learning regarding the importance of thinness (Penniment & Egan, 2011). Dancers higher on perfectionism were also more likely to directly experience greater TREs. Dancers who reported higher TRL in their dance classes experienced more ED symptoms. A direct relationship between perfectionism and ED symptoms was found where dancers with higher perfectionism experienced more ED symptoms, which supports the very well established link between perfectionism and ED (Bardone-Cone et al., 2007).

I.1 Overeating and over-restriction as bipolar eating attitudes

Overeating and over-restriction are two bipolar behaviours that have been introduced by theorists as alternative terms to the formal anorexic-bulimic distinction (DaCosta & Halmi, 1992). This distinction was made in order to investigate and understand

deeper the nature of these behaviours, the reasons why people adopt them and the influences that the personality of the person, but also the genes, the family, the peers and the society put on (DaCosta & Halmi, 1992). The prevalence of anorexia nervosa in the adolescent female population is approximately 0.28% (Hoek, 2002). However, in ballet students the prevalence is much higher, ranging from 1.6% in Australia (Abraham, 1996) to 25.7% in Canada (Garner et al., 1987), with figures of 1.8% in Italy (Ravaldi et al., 2003), 4.1% in South Africa (Le Grange, Tibbs, & Noakes, 1994) and 6.5% in the US (Garner & Garfinkel, 1980). Similarly, the prevalence of bulimia nervosa in the juvenile female population is around 1%, but between 1.3% (Abraham, 1996) and 14.2% in dancing students (Garner et al., 1987).

The generally accepted conclusion is that ballet students are at a high risk of developing ED, going from overeating and developing bulimia to over-restriction and developing anorexia. This however, can also happen vice versa (Garner et al., 1987). This higher risk has been attributed mainly to the high prevalence in young ballet students of personality traits such as drive for thinness and perfectionism (Thomas, Keel, & Heatherton, 2005). Ballet students present some other risk factors characteristic of 'aesthetic sports' as well such as intense physical exercise and very thin body shape model. (Sundgot-Borgen & Torstveit, 2004). These factors are characteristic of ED in the general population, but the greater prevalence found in dance students is likely to be related to the nature of dancing itself. Intensive physical exercise and a very thin body shape model are specific risk factors that are found in athletes who compete in 'aesthetic sports' (Sundgot-Borgen & Bratland-Sand, 2012), but in the studies carried in dance schools, competitiveness and perfectionism have emerged as the mosto common risk factors, with more competitive schools presenting a greater risk of ED (Garner & Garfinkel, 1980). In addition, dancers at national ballet schools have more drive for thinness, more perfectionism and are more likely to diet and to induce vomiting to control their weight than those at local schools (Thomas et al., 2005). In a study of professional dancers with a mean age of 24.7 years, a third reported a history of AN or BN (Brooks-Gunn, Warren, & Hamilton, 1987). Recently, in a group of dancers aged approximately 26, 83% of them were found to meet lifetime criteria for eating disorders, including AN (6.9%), BN (10.3%) and EDNOS (55.0%) with the latter having the greatest percentage (Ringham et al., 2006).

I.2 The influence of social environment on eating attitudes

The high competition and the demand to remain extreme skinny, forces in a way lots of classical ballet dancers to adopt ED. The social pressure, especially at a very young age, plays an important role in food intake. Parents, coaches and peers may influence the athletes, in particularly those with low self-confidence and self-esteem (Garfinkel & Garner, 1982). Even those dancers who are satisfied with their appearance viewing themselves as quite slim, they believe that in order to maximize their performance they had to keep on trying to have and maintain the "ideal" for the specific sport body weight. An important factor in shaping this mentality could be their social environment and mainly the pressure or influence they underwent by coaches, parents and co-gymnasts. At the same time, the quality of the relationships athletes form with their parents and coaches, along with acceptance by sport fans, mainly in elite sports, may lead to assuming a disordered stance against food (Garfinkel & Garner, 1982).

The psychosocial environment generally affects athletes in their everyday life, especially as far as children and their parents are concerned. The family environment plays a very important role to the adoption of any type of an eating disorder. Studies on anorexic individuals showed problems with separation, overprotection and conflicts between them and their parents (Garfinkel & Garner, 1982). Crisp et al. (1980) reported disturbed relationships between anorexic children and their parents, and children reported low autonomy and sense of freedom. Families of anorexics show low expressed emotion, indicating disapproving interactions (Hodes & le Grange, 1993). Sights and Richards (1984) noted bulimics' families to display marked parent-daughter stress and rated bulimics' mothers as being demanding. Schmidt, Humfress and Treasure (1997) noted that severity of family dysfunction corresponds closely to severity of personality pathology in affected individuals.

In clinical populations, some studies report parents of ED children to show disturbed eating and body-image attitudes (Hall & Brown, 1983). Other studies indicate an absence of differences between parents with and without eating-disordered daughters (Hall et al., 1986). Ward and Ramsay (2000) found that ED patients display pathological attachment tendencies. Some studies indicate that people with anorexia report one or both

parents to be less warm and caring with them (Rhodes & Kroger, 1992; Steiger et al., 1989). Rhodes and Kroger (1992) in particularly, found anorexic individuals to worry about their parent's fighting or a possible separation. Eating disorders are also associated with sexual abuse by family members. Almost 30% of ED patients report that they had some unwilling sexual experience while they were kids (Everill & Waller, 1995; Wonderlich & Brewerton, 1997). It makes sense then why people who had a traumatic sexual experience with their bodies tend to overestimate them in the future.

However, it is not only the family that plays a crucial role to the development and adoption of ED but also the general social environment of the individual. In the sport context, the coach, the parents, the co athletes, the administrators and the judges are the ones who may put influence on an athlete the most (Garfinkel & Garner, 1982). Having on mind the cultural factors as well, it makes sense that ED are prevailing in the West. The western culture promotes beauty as slimness and in order for an individual to be successful in some jobs, he/she also has to be good looking (Garfinkel & Garner, 1982).

Kerr, Berman and de Souza (2006) conducted research on perspectives of athletes, coaches, parents, and judges when it comes to disordered eating in women gymnasts. They wanted to better understand the eating and weight control behaviours of female gymnasts that are associated with social pressure. Results suggested that the coaches were worried about being blamed for athletes' eating disorders (Kerr et al., 2006). While 15% of the parents reported that the coach advised the gymnast to lose weight, only 4% of the responding coaches said they did this. The current gymnasts reported having or having had far fewer eating disorders (3%) and disordered eating behaviours (18%) than the retired gymnasts (20% and 73% respectively). A common theme amongst the groups of current and retired gymnasts, parents, and judges pertained to the role of the coach, in particular the excessive control or inappropriate use of control by the coach (Kerr et al., 2006). Although all of the participants had an accurate knowledge of eating disorders, disordered eating, their signs and symptoms, every group recommended further education on related topics. The participants wanted to know more about nutrition, child development, female adolescent development, body image, and the psychological aspects associated with elite gymnastics (Kerr et al., 2006).

Buchholz et al. (2008) evaluated the effectiveness of an eating disorder prevention program, developed by experts in the field of eating disorders, with input by athletes, parents, coaches and administrators. They assumed that within the intervention group there would be decreased scores on athletes' measure of pressure to be thin within sports clubs, awareness and internalization of societal emphasis on appearance, disordered eating attitudes and behaviours, and self-efficacy over dieting pressures within the sports clubs, as compared to the control group. To evaluate athletes', coaches' and parents' perceptions of pressures and support in the sports clubs, The Climate in Sport Setting Scale (CISSS) was developed. They also used the Body-Esteem Scale for Adolescents and Adults (BESAA; Mendelson, Mendelson, & White, 2001), a 23-item self-report questionnaire used to assess attitudes and feelings about one's body and appearance.

Eating attitudes and behaviours were measured using the Eating Attitudes Test (EAT-26; Garner et al., 1982). The Sociocultural Attitudes towards Appearance Questionnaire (SATAQ; Heinberg, Thompson & Stormer, 1995) was used to examine the athletes' recognition and acceptance of socially sanctioned standards of appearance. Parents and coaches completed the Climate in Sport Setting Scale (CISSS) based on their perceptions of pressure to be thin felt by their daughters/athletes in their sports. Parents also completed the Parental Eating Attitudes Questionnaire, a 10-item which examines beliefs surrounding thinness and success for women (PEAQ; Buchholz & White, 1996). They also completed an adapted version of perceived Self-Efficacy over Dieting pressures experienced by their daughters (Neumark-Sztainer et al., 2000).

The pre-intervention results showed that coaches, parents, and athletes perceived significant pressure to be thin in the sport environment (Buchholz et al., 2008). The intervention was found to have a modest but positive influence on participants' perceptions of pressure from within their club to be thin. There were no significant changes on body-esteem measures, the SATAQ, Self-Efficacy or the EAT-26. No significant change was observed over time on mothers' measures either (Buchholz et al., 2008).

Research shows that there is a well-established link between problematic relationships and eating psychopathology (Fairburn, Cooper, & Shafran, 2003; Jacobi et al., 2004). Familial relationships that are overly protective are reported amongst eating disordered patients (Bruch, 1973; Minuchin, Rosman, & Baker, 1978). Similarly, eating

disordered women report poor relationship quality with significant others such as romantic and martial partners (Boyes, Fletcher, & Latner, 2007), close friends (Gerner & Wilson, 2005; Schutz & Paxton, 2007) and siblings (Lehoux & Howe, 2007). Moreover, a number of studies have indicated the dysfunctional relations with parents and significant others as predictions of unhealthy eating attitudes and behaviours (Johnson et al., 2002; Stice, Presnell, & Spangler, 2002). Within the athletic field, research examining the links between eating psychopathology and relationship functioning is quite scarce. However, there is a small body of researchers who implicate interpersonal factors in problematic eating. These factors include the coach–athlete relationship, the coach interpersonal behaviours (Biesecker & Martz, 1999; Jones, Glintmeyer, & McKenzie, 2005; Muscat & Long, 2008) and teammate–athlete relationships (Rosen et al., 1986; Williamson et al., 1995).

In particular, coach–athlete relationships is characterised by increased conflict, power struggles and lack of support (Jones et al., 2005), and a coach who maintains an autocratic coaching style (Biesecker & Martz, 1999), as well as a coach who implements continuous monitoring and teasing of athletes' weight and eating practices (Muscat & Long, 2008), are all associated with athletes reporting eating psychopathology. Similarly, teammates are thought to influence disordered eating through social pressure regarding body weight and size (Williamson et al., 1995) and encouragement to engage in pathological weight-control methods, such as the use of laxatives and diet pills or self-induced vomiting (Rosen et al., 1986). The findings of the studies mentioned above provide a limited understanding of the association between relationship difficulties and eating psychopathology, due to their focus on the dynamics on one specific relationship dyad (e.g. coach–athlete or teammate–athlete relationship), rather than examining the influence of multiple relationship dyads (Muscat & Long, 2008).

Although it is accepted that within an athlete's social environment the coach is important and crucial to athlete's development and wellbeing (Jowett & Cockerill, 2003; Wylleman & Lavallee, 2004), several studies have shown that parents and teammates also play an important role in shaping the athlete's experiences (Holt et al., 2008; Smith, 2007), development (Wuerth, Lee, & Alfermann, 2004) and wellbeing (Gould et al., 1996; Jowett & Cramer, 2010). Only one study has simultaneously examined the influence of the quality of multiple social relationships (coaches, parents and sport friends/peers) on disturbed

eating attitudes amongst athletes (Scoffier, Maïano & d'Arripe-Longueville, 2010). Scoffier et al. reported that the quality of the parent–athlete relationship and peer acceptance was directly related to athletes' disturbed eating attitudes, whereas the quality of the coach–athlete relationship and sport friendship influenced disturbed eating attitudes indirectly through perceived physical ability.

While it is important to consider the importance of the various significant relationships, it is also important to begin to understand the factors that connect the relationship functioning and the eating psychopathology amongst athletes (Wylleman et al., 2007). Previous literature identifies three important variables: self-esteem, perfectionism and depression. Each of these factors has also been shown to be independently related to both disordered eating (Bardone-Cone et al., 2007; Button et al., 1997; Dunkley et al., 2006; Stice, Presnell & Bearman, 2001) and dysfunctional relationships with significant others (Haring, Hewitt, & Flett, 2003; Thomas & Daubman, 2001; Waldinger, Vaillant, & Orav, 2007). In keeping with the literature (Scoffier et al., 2010), it was predicted that athletes who report poor-quality relationships with their parents, coaches and teammates would report increased eating psychopathology. In addition, the aforementioned study examined whether any specific relationship would be more synonymous with elevated eating psychopathology. While it was predicted that poor quality relationships with parents, coaches and teammates will be related to eating psychopathology, the coach is viewed as more important and crucial to the athletic development and wellbeing than any other person (Scoffier et al., 2010).

Annus and Smith (2009) proposed that participation in dance alone cannot explain ED risk in dancers, as dance training environments vary in the degree to which they emphasise thinness and dieting. In a sample of 500 college women who were asked to retrospectively report their participation in dance class and current ED symptoms on the EDE-Q (Fairburn & Beglin, 1994), it was found that the mere amount of involvement in dance class was unrelated to ED symptomatology; instead reports of learning experiences during dance classes concerning thinness or restricting food predicted adult disordered eating. Thinness and restricting expectancies were measured on the 44 item thinness and restricting expectancy inventory (TREI; Hohlstein, Smith, & Atlas, 1998), an example of an item being 'if I were thin, I would feel more worthwhile'.

Annus and Smith (2009) also proposed perfectionism may affect perceptions of messages regarding thinness and weight in dance class. Dancers with elevated perfectionism may perceive a greater emphasis on thinness within their dance class and expect a more positive result from achieving a very low body weight. Within this high-risk dancer group, it is possible that ED symptomatology varies as a function not only of external, environmental pressure for thinness, but also of an internal, individual imposed level of perfectionism (Annus & Smith, 2009). Therefore, examining not only the role of the learning environment, but also the role perfectionism plays in placing dancers at risk for developing ED is important.

I.3 Self-regulation and balanced eating behaviour

The term self-regulation (Carver & Scheier, 1998, 1999) means different things to different people. In the context of sport, we use it to convey the sense that self-corrective adjustments are taking place to stay on track for the purpose being served. Human behavior is a continuing process of moving toward goal values, and this process invoves the characteristics of feedback control. A number of people have ascribed to the term self-regulation the additional quality of overriding or restraining an impulse (Baumeister & Vohs, 2004). The function of shifting from one goal to another is an important phenomenon that has been overlooked (Dreisbach & Goschke, 2004; Shallice, 1978). Many goals are typically under pursuit at the same period or even at the same time (Atkinson & Birch, 1970; Murray, 1938) but only one can have top priority at a given moment. People need to maintain the intentions that are being pursued (Shah, Friedman, & Kruglanski, 2002), but they also need to be able to shift flexibly among goals in order to finally achieve them (Shin & Rosenbaum, 2002).

The issue of priority management was underlined lots of years ago by Simon (1967). He pointed out that if an individual has many goals, then a mechanism is needed in order to change rankings as necessary. Most of the goals people are pursuing are largely out of awareness at any given moment. Only the one with the highest priority has full access to consciousness (Simon, 1967). Sometimes some events occur during the pursuit of that top-priority goal that creates problems for

another goal that has a lower priority. Indeed, the passing of time can sometimes create a problem for the second goal, because the passing time may be making its achievement less possible. If the second goal is also important, any emerging problem for its achievement needs to be taken into account. If the situation evolves enough to seriously threaten the second goal, some mechanism is needed for changing priorities, so that the second goal replaces the first one (Simon, 1967).

The idea that there are longer and shorter-term goals, which can come into conflict with each other, is also part of a literature on self-control and self-control failure (Baumeister & Heatherton, 1996; Baumeister, Heatherton, & Tice, 2002). This literature focuses on cases in which a person is both motivated to act and motivated to restrain that action. In some ways, the logical structure of the cases addressed in this literature also resembles the logical structure of the delay of gratification paradigm. A difference is that in the cases now under consideration the intent often is to delay indefinitely rather than temporarily. The literature on self-control failure tends to portray these cases as involving a relatively automatic tendency to act in one way, which is opposed by a planful and effortful tendency to restrain that act. The action that is being inhibited is often characterized as an impulse, a desire that would automatically be translated into action unless it is controlled (perhaps in part because this action is habitual, perhaps in part because it is more primal). The restraint is presumed to be effortful, and to depend on limited resources. If the planful part of the mind is fully enough able to attend to the conflict, the person may be able to resist the impulse. If not, the impulse is more likely to be expressed. This portrayal seems consonant with the two-mode models of functioning (Carver, 2005).

I.4 Dynamical systems and eating behaviour

Flapping of a butterfly's wings in one location could generate a cascade of events culminating in a tornado in a distant location such as Texas (Fulford, Hoff & Sadler, 2010). Social psychology has developed into a science that is rich in insight but devoid of theoretical consensus, let alone explanatory coherence (Vallacher & Nowak, 2007). Any phenomenon can be explained as a system of interacting elements. People's thoughts, emotions, and actions can evolve and change in the absence of external influence (Vallacher & Nowak, 2007).

Although strong influences are required to promote a lasting change in a person's thought and behaviour, small influences can prove sufficient under some conditions. (Vallacher & Nowak, 2007). This means that a series of small effects are likely to have little impact on the long-term dynamics of the system. If these effects are concentrated in time, however, their combined effect can be sufficient to move the system into a basin of attraction for qualitatively differences. **S**ome people may be more vulnerable to situational influences than others. Individuals differ in their characteristic level of action identification. People with an uncertain, unclear, or unstable sense of self have proved to be very responsive to social feedback, social comparison, and social influence. Uncertain people are not only responsive to influence, they actively seek it out in an attempt to impose structure and clarity on their mental, affective, and behavioural processes (Vallacher & Nowak, 2007).

One of the features of human thought and behaviour is the tendency to stabilize on certain states and resist change (Johnson & Nowak, 2002). The maintenance of positive psychological states, including high self-esteem (Tesser, 1988), perceptions of personal control (Taylor & Brown, 1988), and positive mood. Most people actively maintain positive moods, high self-esteem, and a sense of personal control (Johnson & Nowak, 2002). There is a tendency for psychological systems to show stability and resistance to change (Vallacher & Nowak, 2007). In a system governed by attractor dynamics, situational influences up to a certain magnitude may have only a transient effect because of the tendency for a system to return to its attractor after perturbation. Beyond a certain threshold, however, an external factor can have a lasting effect on the person's thought or behaviour (Vallacher & Nowak, 2007).

An attractor refers to a subset of potential states or patterns of change to which a system's behaviour converges over time (Vallacher et al., 2010). There are three types of attractors (Eckmann & Ruelle, 1985; Nowak & Lewenstein, 1994; Schuster, 1984): fixed-point attractors, periodic (including multiperiodic) attractors, and deterministic chaos (intrinsic dynamics characterized by very irregular evolution). In psychological systems, a fixed-point attractor can be similar to the notion of equilibrium or homeostasis. A system governed by fixed- point attractor dynamics, in other words, will consistently evolve to a

particular state, whether or not this state is pleasant, and will return to this state even when perturbed by outside influences that could promote a better state (Vallacher & Nowak, 2007).

A system, however, may have more than one attractor. Attractors do not necessarily represent goals, values, or other desired states. A basin of attraction specifies the range of states that will evolve toward the attractor. The same element (an event, a communication, etc.) can be responded to in very different ways, depending on which attractor is currently manifest. This tendency, referred to as hysteresis, is a signature phenomenon of nonlinear dynamical systems (Vallacher et al., 2010). Attractors provide a stable platform for action. Formally, the identification of an attractor is difficult because an attractor is defined mathematically in terms of differential or difference equations. The gradual and long-term construction of a new attractor may be very difficult, but it prepares the ground for a positive state that would be impossible without these actions (Vallacher et al., 2010).

In a system with fixed-point attractors, first of all, change may involve altering the number, position, and shape of the attractors. This type of change is described by catastrophe theory (Vallacher & Nowak, 2007). In this model, two variables—a splitting factor and a normal factor—control the attractor landscape of the system. The splitting factor, functioning as the control parameter, decides whether the system reacts in a linear or nonlinear way to changes in the normal factor. For low values of the splitting factor, the system is characterized by a single attractor, the position of which changes in a monotonic fashion with changes in the normal factor. For higher values, the single attractor splits into two attractors whose values diverge with increases in values of the splitting factor (Vallacher & Nowak, 2007). The splitting factor in this model is social pressure regarding the formation and maintenance of close relations. The normal factor is the perceived attractiveness of the potential partner. For low values of social pressure (e.g., non-salience of social norms), the desired closeness of the relationship was a direct function of perceived attractiveness. For high values of social pressure (e.g., against forming a relationship with a stranger but for maintaining a relationship once it is formed), however, there were two attractors corresponding to preferred closeness—one for a distant relationship, the other for a close relationship (Vallacher & Nowak, 2007).

Human behaviour indicates the pursuit of goals and the avoidance of punishments choice, effort, and persistence regarding goals. If goal progress falls below an implicit criterion (e.g., expected progress or intended progress), negative affect arises and effort toward that goal increases; if goal progress exceeds the implicit criterion, positive affect arises and effort toward that goal decreases. Positive affect—a signal of surging ahead—may mean that the goal to which it relates can assume a lower priority; less effort would be expended toward this goal, which would free attention and resources for other needs. If another goal needs attention at that point, effort might shift to it; this again represents a reordering of priorities. The idea that people increase effort when they are lagging behind is not controversial. In contrast, however, the idea that people reduce effort when they are doing unexpectedly well is not intuitive. When people were relatively close to a goal, positive feelings prompted a decrease in effort toward that goal and a shift of effort toward an alternate goal. First, people responded to failure to meet expected goal progress by increasing subsequent effort toward that goal, and they responded to unexpectedly high goal progress by relaxing effort and coasting. The overall pattern of results supports the broad notion that overshoots and undershoot of progress criteria are important principles underlying dynamic management of goal-directed effort (Fulford, Hoff & Sadler, 2010).

Chaos itself, as a term of social dynamical systems, is a particular nonlinear dynamic and is perhaps the centrepiece of this field of study. In chaotic phenomena, seemingly random events are actually predictable from simple deterministic equations. Thus a phenomenon that appears locally unpredictable may indeed be globally stable, exhibit clear boundaries, and display sensitivity to initial conditions. Catastrophes are sudden changes in events; they are not necessarily all bad things as the word “catastrophe” might suggest. Catastrophes involve combinations of attractors and bifurcations, and are operating in some self-organizing events (Guastello, Koopmans & Pincus, 2009).

Changes are unpredictable and not explicable by any known concepts or predictors. The concept of equilibrium is no longer specific enough to describe either the change or the events that surround the point where change stops. Large inputs sometimes produce small results, and a small input at the right time can produce a dramatic result. Simple deterministic equations can produce processes that appear random, but closer scrutiny may

indicate that they are not. It follows that a lot of so-called error variance can be accounted for if we can identify the processes that generated the observations; those processes are most likely to be overwhelmingly nonlinear events that occur without any apparent connection to prior events or to any clues about which the speaker is aware (Guastello, Koopmans & Pincus, 2009).

I.5 Aims, purpose of the study and hypotheses

This study attempts to investigate the dynamics of eating attitudes of female dancers in classical ballet, a sport at risk regarding weight and body image concerns. In a sport like this, it is important for athletes to be able to self-regulate their eating behaviours in a balanced and healthy way. Oscillating between maladaptive eating behaviours, such as overeating and over-restriction, can thus be seen as a failure in athletes' self-regulation of eating attitudes, which is more likely to occur in the face of social pressure (Thompson & Sherman, 2009).

Our hypothesis is that female classical ballet dancers, who are skilled in self-regulation eating attitudes, should stay in the monostable configuration with balanced and healthy eating behaviours. Those with low self-regulation capabilities would undergo instability from overeating to over-restricting.

The identification of the typical stable/unstable eating behaviours that were expected to be observed will follow the methodology that was used by Johnson and Nowak (2002) to categorize the level of (in) stability of patterns associated with bipolar depression. From a theoretical point of view, supporting our hypotheses empirically would promote a new model to account for the adaptive /maladaptive patterns of eating behaviours among classical ballet dancers. Moreover, this would stress the relevance of the dynamical approach to eating behaviours which, though they are known to evolve over time, have never been examined with respect to their dynamics. From a practical perspective, the expected findings of this research should provide parents and coaches with personal and contextual indicators that might warn them about the dancers' approach to potential periods of instability regarding their eating behaviours.

II. Method

II.1 Participants

Participants included 50 female classical ballet dancers (M_{age} = 20.1, SD_{age} = 3.24) from the Young Men's Christian Association which is located in Thessaloniki, Greece. The dancers were from various age group divisions. All of them competed in a professional level though and aged between 15 and 25 years. All the dancers had at least 10 years of classical ballet experience. Dancers were all Caucasian (N = 50; 100%).

II.2 Materials

Demographic Questionnaires. The items on the demographic questionnaire for the dancers included age, sex, birth place, session, location and date.

The English version of Self-Regulatory Eating Attitude in Sports Scale (SREASS) (Scoffier, Paquet, Corrion & d'Arripe-Longueville, 2009). This is a scale assessing the self-regulation of eating attitudes in sports contexts. The SREASS is composed of five subscales that refer to the specific contexts that significantly influence the control of eating attitude in athletes. These are food temptation, negative affects, social interaction, lack of compensatory strategies, and lack of anticipation of consequences on performance. Scoffier et al. showed that this instrument has good factorial and congruent validities as well as a good temporal stability. Each of its subscales has a satisfactory internal consistency (coefficients alpha ranging from 0.84 to 0.92). The validity of the tool was successively demonstrated using exploratory factor analysis and CFA and partial invariance according to gender. The reliability of the SREASS was demonstrated using a satisfactory internal consistency and temporal stability and the external validity was confirmed.

The clarity of each item was evaluated on a six-point Likert-type scale from (1) ‘‘not at all clear’’ to (6) ‘‘completely clear.’’ The minimum and maximum scores possible were 1 and 6 and all possibilities were used by participants. The factorial structure was examined by principalaxis factor analysis (Oblimin-type rotation). In order to extract the most appropriate factors, parallel analysis (Horn, 1965) was used. In the random distribution, values lower than the factor weights were shown only for the first five factors

This extraction method revealed five factors without constraint to the model. Next, the five-factor model was examined by factor analysis without additional constraint. The following items were not retained: items showing saturation coefficients above 0.40 on two factors simultaneously, those whose saturation coefficients did not reach this value on either of two factors, and those that did not saturate on a single factor that loaded most of the items with similar semantic contents (Guttman, 1954). These criteria were used to select the 16 items and included two inversed items (items 2 and 9). Each of these retained items saturated with a weight 40.65 on the expected factor and with a weight o0.35 on the other factor. The items were loaded onto five factors pertaining to the self-regulation of eating attitude in the following contexts: (a) food temptation (i.e., Do you feel capable of controlling what you eat when your favorite food is set before you?); (b) negative affects (e.g., Do you feel capable of controlling what you eat when you are irritable?); (c) social interaction (e.g., Do you feel capable of eating a normal amount of food when you have a meal with your parents?); (d) lack of compensatory strategies (e.g., Do you feel capable of making yourself vomit if you've just eaten cake at a birthday celebration?); and (e) lack of anticipation of consequences on performance (e.g., Do you feel capable of eating dessert without thinking about the consequences it may have on the next competition?).

Next, the number of items for each of these five factors was extended so that we could select the most pertinent formulations in the next step. Factor 1 explained 24.23% of the variance and contained four items measuring the lack of anticipation of consequences related to performance; factor 2 explained 18.04% of the variance and contained three items relative to food temptation; factor 3 explained 12.35% of the variance and contained three items relative to compensatory strategies; factor 4 explained 8.89% of the variance and contained three items relative to social pressure; and factor 5 explained 6.62% of the variance and contained three items relative to negative affects. The data were subsequently organized according to a five-factor model with 70.15% of the variance explained, which was satisfactory (Gorsuch, 1983).

The virtual self-service restaurant (VSSR) (Scoffier, Gernigon, Billi, d'Arripe-Longueville, 2013). The VSSR is a virtual interface for choosing the composition of five meals a day from a wide range of food offering. Geier and Rozin (2009) showed that the

evaluation of the caloric content of a meal was biased by the unstandardized units and the tendency to choose a single variable for assessing the quantity**.** Research in the field of nutrition has shown that, generally, when eating behavior is projected virtually individuals ignore the thickness of a piece of food and concentrate on its size and judgments of size tend to decrease as the absolute size increases. In addition, individuals develop rules for evaluating the number of calories based on what seems to be a standard size for the food in question and foods perceived as healthier are assumed to have lower caloric density (Scoffier et al., 2013)**.** Thus, in order to curb these biases in the virtual screening of food intake and to obtain quantity assessments that are as accurate as possible, the VSSR does not mention the number of calories but refers only to the type of container (e.g., glass, bowl, soup spoon).

The perception of the quantity of each food chosen by the participants is based on personal eating habits using measured quantities from a container. A picture is used as a guide for each food. Two sport dietitians who viewed this method as an appropriate means for assessing athletes' food habits agreed to evaluate the interface. This interface assesses: (a) basal metabolism using Black et al. (1996) equation 1, (b) the energy expended for physical activity, and (c) the overall energy expenditure. The overall intake is assessed from the food choices made for a given day and all these data are then used to calculate the difference between energy intake and energy expenditure. The calculation of the difference between energy intake and energy expenditure can provide the self-regulation of eating attitudes. When energy intake and expenditure are balanced, good self-regulation of eating attitudes can be assumed. With increasingly greater imbalance between energy intake and expenditure, increasingly less optimal self-regulation of eating attitudes should be suspected (Scoffier et al., 2013)**.**

II.3 Procedure

Permission to conduct the study was obtained from the Ethics Committee of the University as well as from the administrators of the Young Men's Christian Association of Thessaloniki, the dance teachers and the parents of the athletes who were under 18. Dance teachers were initially contacted via phone or e-mail requesting permission for their dancers to participate in the study. Dance teachers who expressed interest in the study were

informed about the procedure and were sent a packet of information that contained a letter outlining the study, a consent form for the dance teacher and parental consent forms for all the dancers at the beginning of the survey. Some of the dancers were under 18, therefore, their parents or guardians provided consent. Questionnaires for the dancers were administered right after a dance lesson through the sport season, while The Virtual Self-Service Restaurant was filled by them over eight weeks, not the same day by all of them and before the dance lesson began.

II.4 Analyses

In order to test whether food intake varies over time differently depending on participants' self-regulatory eating attitude (SREASS), we conducted 2 × 8 ANOVA (SREASS: high vs. low × Moment of measurement) on Food Intake, with repeated (8 times) measures for Moment of measurement. In case of significant main effect for Moment of measurement and significant SREASS × Moment of measurement interaction, Scheffé test were used as post hoc comparisons to identify where the potential significant differences are located.

To test whether food intake variability differs depending on participants' SREASS, we also conducted a one-way ANOVA (SREASS: high vs. low) on participants' standard deviations of their 8 scores of food intake.

III. Results

As the Self-Regulatory Eating Attitude in Sports Scale has not been tested yet for its reliability and validity in the English language, along with the valuable help of Professors Scoffier and d'Arripe-Longueville, we used the English version of the scale. In order to check the reliability of it, we conducted a Cronbach's alpha analysis. The Self-Regulatory Eating Attitude in Sports Scale in the English language was found to be highly reliable (16 itams; $\alpha = .84$) (Table 1).

Table 1

Reliability statistics of the 16 items of the Self-Regulatory Eating Attitude in Sports Scale in the English language

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.848	.841	16

The 2 x 8 ANOVA (SREA × Week) that was conducted on food intake revealed a significant main effect for SREA, F (1, 48) = 6.65, $p < .05$, and a significant main effect for Week, F (7, 336) = 10.90, $p < .001$. However, these main effects were superseded by a significant interaction SREA × Week effect, F (7, 336) = 3.33, $p < .01$ (Table 2).

Table 2

Main effects for SREA, Week and interaction effect for SREA × Week

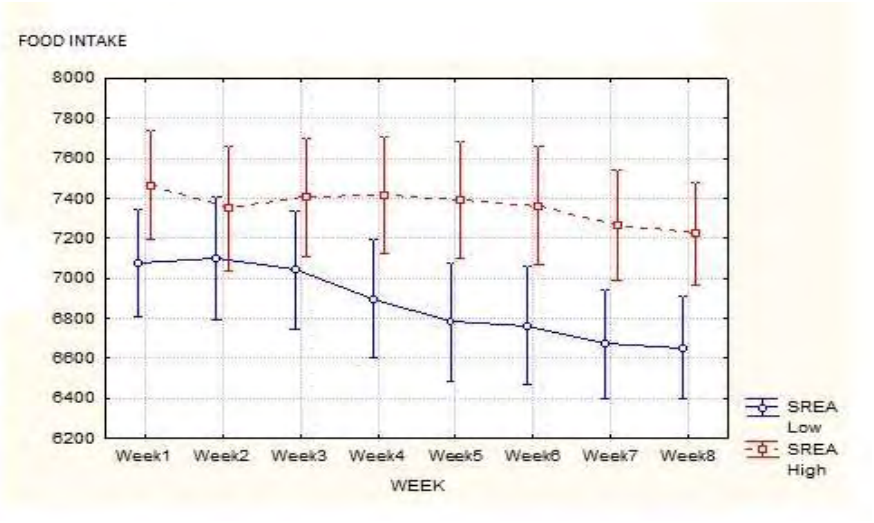
Source	df	F	p
SREA	1 48	6.65	.013*
Week	7 336	10.90	.000**
SREA × Week	7 336	3.33	.014***

*p < .05. ** p <.001. *** p < .01

Follow-up Scheffé tests showed that the level of food intake for the low SREA group was lower at week 7 than at weeks 1 ($p < .05$) and 2 ($p < .01$). The level of food intake for the low SREA group was also lower at week 8 than at weeks 1 ($p < .01$), 2 ($p < .01$), and 3 ($p < .05$). No significant differences were found for the high SREA group. The levels of food intake over time (weeks) according to SREA groups are in displayed Figure 1.

Figure 1

Levels of food intake over time (weeks) according to SREA groups



The one-way ANOVA (SREA: high vs. low) that was conducted on each participant's standard deviation of her 8 scores of food intake revealed a significant effect, F (1, 48) = 6.44, $p < .05$. The low SREA group (M = 307.25, SD = 159.90) showed a larger standard deviation than did the high SREA group (M = 209.92, SD = 105.88) (Table 3).

Table 3

Means and Standard deviations of SREA groups

Source	*N*	*M*	*SD*
Low SREA group	25	307.25	159.90
High SREA group	25	209.92	105.88

IV. Discussion

The purpose of the study was to investigate the dynamics of eating attitudes of female dancers in classical ballet, a sport at risk, regarding weight and body image concerns. In a sport like this, it is important for athletes to be able to self-regulate their eating behaviours in a balanced and healthy way. Our hypothesis was that female classical ballet dancers, who are skilled in self-regulation eating attitudes, should stay in the monostable configuration with balanced and healthy eating behaviours. This means that the dancers would indicate a balanced food intake attitude. On the other hand we hypothesized that those dancers with low self-regulation capabilities would undergo instability from overeating to over-restricting, regarding their food intake. Our results showed that those dancers who scored high on the self-regulation scale maintained a balanced diet, without statistically significant differences on their food intake across the eight week period. On the contrary, those dancers who scored low on the self-regulation scale had statistically significant differences between the weeks on the eight week period of time regarding their food intake.

Research so far shows that there are various risk factors that contribute to the development and adoption of eating disorders in women including genetics, socio-cultural ideals, familial relationships and interactions, trauma, and personality characteristics (Striegel-Moore & Cachelin, 2001). In our case, athletes are a unique population and they could be even more vulnerable from time to time. They also encounter a series of sport-specific issues and influences. To begin with, the athletic environment may promote behaviours such as over activity or rigid dieting, characteristics of eating disorders (Thompson & Sherman, 1999b), or even ignore symptoms of eating disorders, such as amenorrhea, because in the sport context athletes might face these problems as normal (Thompson & Gabriel, 2004; Sherman et al., 2005). Secondly, athletes are influenced by both socio-cultural factors in order to maintain thin, as there is a stereotypical body-type of their sport (Thompson & Sherman, 1999b). Therefore, once an athlete's body does not match the norm, this can result in dangerous decisions, such as very strict diets, a risk factor for the later development of eating disorders (Sundgot-Borgen & Bratland-Sanda, 2012).

Additionally, the competitive nature of athletes may lead to what is called ‘‘competitive thinness’’ (Thompson & Sherman, 2010). Athletes are compared to one another very often and this might result in an endless competition, differences in appearance and negative feelings about their bodies (Greenleaf, 2002; Mosewich et al., 2009). Coaches may also put pressure on athletes and push them in order to adopt an unhealthy diet or over exercise in order to maintain the ideal weight (Biesecker & Martz, 1999; Heffner et al., 2003; Kerr, Berman & De Souza, 2006; Rosen & Hough, 1988). Social pressure and a competitive environment alone however cannot provide a clear explanation of the high percentages of eating disorders in ballet schools. However, differences in terms of performance expectations at ballet schools could at least provide explanations about the existing problem, especially as far as anorexia is concerned (Garner & Garfinkel, 1980).

Garner and Garfinkel (1980) found that dancers studying at very competitive ballet schools, that prepare the students for professional dance careers, scored significantly higher on the Eating Attitudes Test (EAT) and showed a higher prevalence of anorexia nervosa than those studying at less competitive schools with a less professional orientation. The atmosphere at these competitive schools is particularly unpleasant, as students have to compete other professional dancers for only limited available positions. Even after a successful entrance, dancers who do not show progress or are unable to maintain the ideal body shape may be asked to leave in order to be substituted by students with more potentials (Garner & Garfinkel, 1980). At the School of American Ballet, a very famous and one of the most competitive classical ballet academies, only 5% of the young dancers who matriculate at age 8 actually complete the training program at age 17 (Dunning, 1985). In a research conducted by Hayward (1985) was shown that 7% of students in a London ballet school were found as possible cases of anorexia nervosa. Lots of authors since then have tried to establish the degree to which anorexia nervosa is present in ballet dancers (Braisted et al., 1985; Calabrese et al., 1983; Garner & Garfinkel, 1980; Hamilton, Brook-Gunn, & Warren, 1985; Maloney, 1983; Szmukler et al., 1985). Several smaller studies that were conducted indicated that the point prevalence of anorexia nervosa among female ballet students ranges from 1.6% (Abraham, 1996) to 7.0%. Lowenkopf and Vincent (1982)

said about the dance community that it is‘‘the most obsessively weight-conscious subculture in [the] country’’ (p. 55).

Since then, the statement that female classical ballet dancers are a high-risk group for the development of eating disorders is still present and true (ED) (Anshel, 2004; Ringham et al., 2006). Dancers usually score higher on measures of eating disturbance (Abraham, 1996; Ackard, Henderson, & Wonderlich, 2004), body dissatisfaction, (Ravaldi et al., 2003; Szmukler et al., 1985), and have higher disturbances in weight control behaviours and eating attitudes (Dotti et al., 2002; Pierce, Daleng, & McGowan, 1993) compared to non-dancer individuals. Dancers spend lots of hours practicing in front of mirrors where their bodies are exposed and therefore have the tendency to compare with one another. Striving for the ideal body shape combined with high levels of perfectionism, including the social pressure for thinness, create the ideal condition for development of ED (Garner & Garfinkel, 1980).

Druss and Silverman (1979) stated that ‘dancers practice exercises ritualistically to stop thinking, feeling, to reduce their bodies to the barest minimum of fat and muscle and to deny themselves all other pleasures in order to achieve that goal. They dare to hope for some brief time to become perfect’ (p. 121). Low weight is absolutely required for those ‘aesthetic performers’ as dancers are, and therefore the thinner their body is, the better the performance they believe they have (Jacobi et al., 2004; LeGrange, Tibbs, & Noakes, 1994).The high risk for development of eating disorders has been attributed to perfectionism and to low self-esteem (Anshel, 2004; Thomas, Keel, & Heatherton, 2005). Striving to conform to strict aesthetic standards and rules for professional success may increase the possibilities to eating disturbances in ballet dancers (Abraham, 1996; Anshel, 2004; Koutedakis & Jamurtas, 2004; Krasnow, 2005).

We agree with Druss and Silverman (1979) who have underlined some common traits between anorexics and ballerinas, such as the elective restriction of food, amenorrhea, hyperactivity, attempt at bodily control and the distortion of body image. Some researchers however found an overestimation in both anorexia nervosa and control groups (Meermann, 1983). Johnson & Dick (1999) suggest that drive for thinness in female athletes arises from beliefs about both performance- and appearance-related thinness. Sport-specific factors, such as intrinsic pressures to be thin, demands of training, and personality traits, also may

hasten the development of eating disorders in athletes (Beals, 2004). Similarly, classical ballet dancers may be exposed to additional internal and external pressures related to thinness and body image. Another risk factor may also be age. Adolescent ballet dancers are at significantly higher risk for the development of eating disorders than older ones (Abraham, 1996; Braisted et al., 1985). Adolescent female dance students and professional dancers may consume 70-80% less than the recommended daily allowance of energy intake (Koutedakis & Jamurtas, 2004).

Findings indicate that ballet dance students have a greater preoccupation with weight, eating habits, and body image than do students in the general population (Anshel, 2004; Koutedakas & Jamurtas, 2004). According to Neumarker et al. (1998), researchers should explore eating attitudes and behaviours in female ballet dancers with respect to specific life situations. Both cultural influences and an innate preoccupation with body image may create an increased vulnerability to disordered eating problems in ballet dancers (Neumarker et al., 1998). Perfectionism has been reported to be a risk factor for eating disorders such as anorexia nervosa and bulimia nervosa, but not for binge eating disorder (Ashby, Kottman, & Schoen, 1998; Bastiani et al., 1995; Forbush, Heatherton, & Keel, 2007; Halmi et al., 1979).

Previous studies have shown that eating disorder prevention programs are largely unsuccessful, so one approach would be to concentrate on the promotion of healthy lifestyles and self-image (Lindner, Hughes, & Fahy, 2008). School-based programs could include realistic ways to improve body image, self-esteem, eating habits, stress management, and self-regulation. Educational endeavours also could be implemented for administrative staff, dance instructors, and parents, incorporating both the psychological and medical components of eating disorders. From a preventive point of view, the results suggest that in dance or ballet teaching it is important to monitor students' level of concern with their body, weight or food and the presence of depressive symptoms prior to their dance studies. Like families (Smolak, Levine, & Schermer, 1999), coaches should also avoid criticisms, disapproval, comments or jokes about the body, weight or food and should act with care and empathy. As dancing and dance training inevitably involve potentially stressful experiences, such as the exposure of the body in public, observations and comparisons of the body in groups, a high level of competitiveness and so on—all at an age

when the risk of developing eating and emotional disorders is at its peak, the supervision of the emotional and cognitive state of the students and the establishment of relations of trust and understanding with coaches are both vital.

Limitations

In interpreting the results of this study, several limitations must be acknowledged. One limitation is that all data were self-reported and thereby subject to socially desirable responding. Although the findings were based on self-report rather than clinical interviews, research suggests that self-report surveys can be both sensitive and accurate in the assessment of eating-disordered behaviours (Keel et al., 2002).

Secondly, our results may be biased by the lack of sincerity among informants or by a failure to report symptoms. However, the study was performed with the consent of the subjects and in complete anonymity. Several steps were taken to encourage honest responding by the participants: No coaches or athletic department personnel were present during data collection, and participants were informed of the confidential nature of their responses, that their identities would not be connected to any reporting of results, and that there were no right or wrong answers.

Another limitation of this study was the small sample size, a fact impairing generalization of the results. Not all the dancers from the ballet school were recruited for participation in the study. Importantly, study was not designed to fully ascertain eating behaviours in all dancers, as funding constraints limited sufficient time to accomplish this goal. Therefore, it is unclear whether the prevalence estimates in this study generalize to the entire population of dancers at this ballet school. However, it is likely that true prevalence of eating disorder attitudes and behaviours are even greater than those reported in the present study, as dancers with significant eating pathology may not have participated in the study, despite assurances of confidentiality.

The self-selected, relatively homogeneous sample in this study may have influenced the findings for some of the variables. The results may not be representative of the entire population of dance students in other colleges and universities across the country, or those in professional dance schools or companies. Further, some students with eating issues may have declined participation due to the subject matter of the study, or concerns about peers, dance instructors, or the researcher finding out about their eating problems even though anonymity was assured. The exclusive reliance on self-report data constitutes another potential limitation. Due to the sensitive nature of the questions, the accuracy and honesty

of the responses may have been limited by participants' aims at positive impression management.

Data on eating disorder risk for other forms of dance are also lacking, warranting further examination in these contexts. Longitudinal studies with larger sample sizes from a variety of geographic locations may help discern the most prevalent risk factors in college dance students. It also would be beneficial to compare professional classical ballet dancers with those who prepare to enter at a professional academy. The adjustment to the new, academy environment may contribute to the onset of disordered eating behaviours (Bradford & Petrie, 2008).

Finally, another limitation is the lack of objective data supporting the existence of pressure from coaches. Nonetheless, we feel sure that pressure of this type does exist. Our conclusions regarding these associations and interactions may not be generalizable to other groups. Other dance schools may have a higher prevalence of ED and may produce different results. From a research perspective, the perpetual stigma and air of secrecy attached to eating disorders makes this a challenging area to investigate. Longstanding covertness, denial, and resistance from the insulated dance community (Montanari & Zietkiewicz, 2000) add to the difficulty of uncovering critical information about eating disorder etiology and risk factors.

Future Research

Findings from this study increase our understanding of the relationship between self-regulation and eating attitudes in classical ballet dancers which contributes to improved identification, prevention and treatment efforts for ballet dancers. Future studies are needed to extend the current findings by comparing dancers who are already diagnosed with EDNOS to those with AN or BN to enhance our understanding of EDNOS diagnoses and associated correlates among dancers. Moreover, family studies of eating pathology are needed to understand the complex mix of genetic and environmental contributions to eating disorders. Researchers will need to examine this potential link to determine the extent that it exists among athletes and whether other factors, such as self-concept, moderate its effects.

Future research may benefit from specific efforts to obtain larger numbers of eating disordered participants so that a clearer picture of the subtle differences between eating disordered and symptomatic women in psychosocial factors can be determined. Future studies should extend this research by using more in-depth interviews or case studies. Moreover, including a wider variety of sports, racial groups, and both genders could elicit helpful information. A useful question for future research would be to examine students in the same dance school to determine if greater levels of perfectionism are related to perceptions of more messages regarding the importance of thinness within the same dance classes, as it may be assumed that individuals in the same dance class are exposed to the same messages regarding thinness.

Future research is required to examine other models that incorporate additional risk factors. Another useful direction for future research also would be to consider exploring and observing the behaviour of educators and the possible effect of actual learning experiences in a dance class. Future studies should seek to employ a prospective approach to determine the directionality of relationship quality with multiple dyads, self-esteem, depression and clinical perfectionism and eating psychopathology. Therefore, future studies should seek to employ a dyadic approach to investigating such an association, as studies have shown that there are often discrepancies in the parent–child perceptions of parental rearing styles in eating disordered individuals (Bonne et al., 2003). Thus, future studies should seek to replicate the present study

with a sample of non-athletic controls, as well as with a clinical sample, in an attempt to understand whether the current observed mechanisms involved in the eating psychopathology of athletes would extend to the general population and patients with eating disorders.

Identification of athletes with eating disorders is considered a complicated and difficult problem (Currie & Crosland, 2009; Petrie & Greenleaf, 2007). Often the traits present in eating disordered individuals are the same traits required to be a top-level athlete, thus preventing the ability to differentiate an eating disordered athlete from a committed and hardworking athlete or a "good athlete" (Thompson & Sherman, 1999). Finally, clinicians working with both athletes and non-athletes should be aware that poorquality relationships are likely to lower self-esteem and increase self-critical perfectionism and depressive symptoms, which further exacerbate disordered eating. Thus, treatment interventions that focus on decreasing depressive symptoms and self-critical perfectionism and enhancing selfesteem may lead to improvements in eating disordered symptoms.

Although some athletes will need one-on-one counseling to resolve the issues that underlie their use of pathogenic weight control behaviours, others may benefit from small group intervention programs that are geared toward reducing thin-ideal internalization, body image dissatisfaction, and a reliance on unhealthy behaviours for managing food intake. In summary, sport psychology consultants who are trained in clinical psychology may be in a position to incorporate the insights from these participants to provide education about eating disorder recovery to the sport community.

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Appendix

Questionnaire

The English version of Self-Regulatory Eating Attitude in Sports Scale (Scoffier, Paquet, Corrion & d'Arripe-Longueville, 2009).

Name:		**First Name:**	**Sex:**	**Birth Date:**
Session #:	**Date:**	**Context/Location:**		

This questionnaire is to assess your eating habits. It is not a test, that is, there are no right and wrong answers. There is no obligation for you to answer the questions, but if you accept, we guarantee that your answers will be kept confidential and will only serve research purposes. To answer each question, you need to circle one number according to the following scale:

Not at all agreed	**1**	**2**	**3**	**4**	**5**	**6**	**Totally agreed**

1.	Do you feel capable of eating a dessert without thinking of the consequences this may have on your next competition?	1	2	3	4	5	6
2.	Do you feel capable of making yourself vomit if you've just eaten cake at a birthday celebration?	1	2	3	4	5	6
3.	Do you feel capable of controlling what you eat when tempting food is put before you?	1	2	3	4	5	6
4.	Do you feel capable of controlling what you eat when a lot of food is easily available?	1	2	3	4	5	6
5.	Do you feel capable of controlling what you eat when you are anxious or worried?	1	2	3	4	5	6

6.	Do you feel capable of controlling what you eat when you are irritable?	1	2	3	4	5	6
7.	Do you feel capable of eating with your training partners without depriving yourself?	1	2	3	4	5	6
8.	Do you feel capable of eating French fries without thinking of the consequences this may have on your performance?	1	2	3	4	5	6
9.	Do you feel capable of eating nothing at a meal using the pretext that your coach is present?	1	2	3	4	5	6
10.	Do you feel capable of controlling what you eat when you are depressed?	1	2	3	4	5	6
11.	Do you feel capable of eating sweets without thinking of the consequences this may have on your next competition?	1	2	3	4	5	6
12.	Do you feel capable of eating a lot of food at a time without thinking of the consequences this may have of your performance?	1	2	3	4	5	6
13.	Do you feel capable of eating three meals a day without making yourself vomit, exercise to excess, or take diuretics or laxatives?	1	2	3	4	5	6
14.	Do you feel capable of eating high-fat foods without making yourself vomit, exercise to excess, or take diuretics or laxatives?	1	2	3	4	5	6
15.	Do you feel capable of eating a normal amount of food when you have a meal with your parents?	1	2	3	4	5	6
16.	Do you feel capable of resisting the sweet foods that you like the most?	1	2	3	4	5	6

Thank you for your participation!